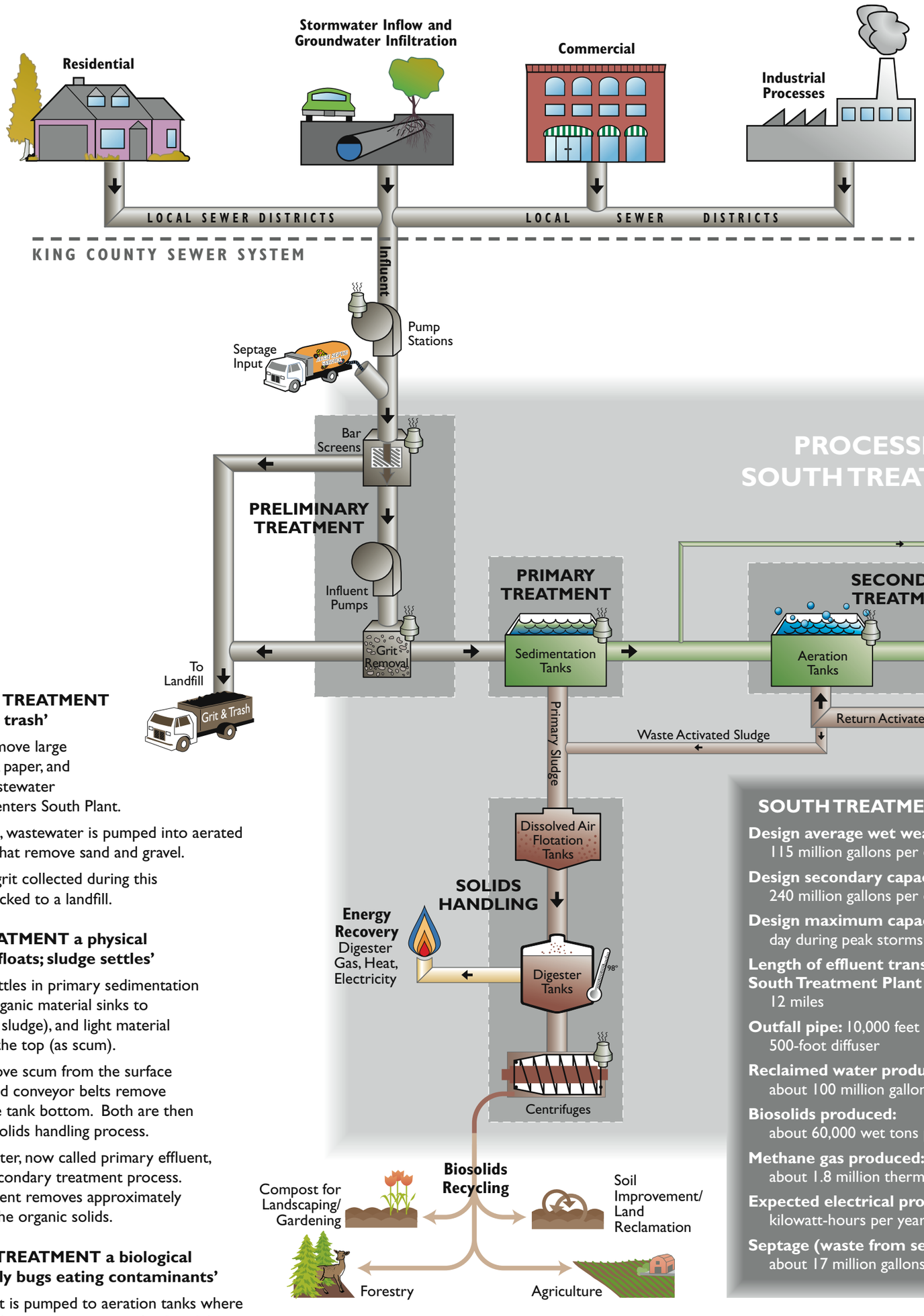
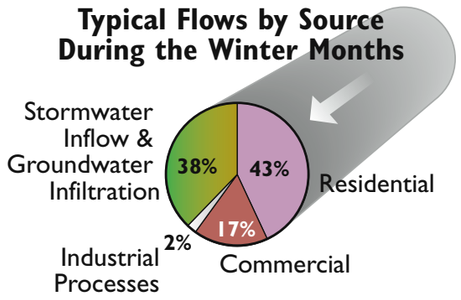
WASTEWATER TREATMENT PROCESS

How is wastewater treated at King County's South Treatment Plant?



WHAT'S COMING INTO THE PLANT?



PROCESSES WITHIN SOUTH TREATMENT PLANT

ODOR CONTROL 'the Sniff Test'
In order to minimize odors, we cover or contain the potentially smelly processes and collect the air for treatment.

PRELIMINARY TREATMENT 'Taking out the trash'

- Bar screens remove large debris like rags, paper, and leaves from wastewater (influent) as it enters South Plant.
- After screening, wastewater is pumped into aerated grit chambers that remove sand and gravel.
- The trash and grit collected during this process are trucked to a landfill.

PRIMARY TREATMENT a physical process 'Scum floats; sludge settles'

- Wastewater settles in primary sedimentation tanks. Heavy organic material sinks to the bottom (as sludge), and light material (oils) floats to the top (as scum).
- Skimmers remove scum from the surface of the water and conveyor belts remove sludge from the tank bottom. Both are then sent onto the solids handling process.
- The treated water, now called primary effluent, flows to the secondary treatment process. Primary treatment removes approximately 60 percent of the organic solids.

SECONDARY TREATMENT a biological process 'Friendly bugs eating contaminants'

- Primary effluent is pumped to aeration tanks where oxygen is added to encourage growth of useful bacteria naturally present in the wastewater.
- These bacteria reproduce and consume suspended and dissolved organic material in the water.
- The wastewater then goes to secondary clarifiers, large round sedimentation tanks where bacteria settle to the bottom of the tank as secondary sludge.
- Most (90 percent) of secondary sludge goes back to the aeration tanks where bacteria continue the process and eat more organic material (return activated sludge). The rest goes to the solids handling process (waste activated sludge).
- The remaining water — secondary effluent — leaves the clarifiers at least 85 percent cleaner than when it entered South Plant.

DISINFECTION 'Zapping pathogens'

- Secondary effluent is chlorinated, destroying most remaining pathogens, or disease-causing bacteria.
- The chlorine dilutes as it flows through the 12-mile-long effluent transfer pipe and meets up with the outfall pipe to exit from the diffuser into Puget Sound.

RECLAIMED WATER 'Saving H_20'

- After disinfection, some secondary effluent undergoes sand filter treatment (coagulation, filtration, disinfection). The water is used on-site for plant processes and cleaning and off-site for landscape irrigation and to replace drinking water use in industrial processes.

SOUTH TREATMENT PLANT FACTS

Design average wet weather flow: 115 million gallons per day

Design secondary capacity: 240 million gallons per day

Design maximum capacity: 325 million gallons per day during peak storms

Length of effluent transfer pipe from South Treatment Plant to Duwamish Head: 12 miles

Outfall pipe: 10,000 feet long, 625 feet deep, 500-foot diffuser

Reclaimed water produced: about 100 million gallons per year

Biosolids produced: about 60,000 wet tons per year

Methane gas produced: about 1.8 million therms per year

Expected electrical production: up to 33 million kilowatt-hours per year

Septage (waste from septic tanks) treated: about 17 million gallons per year

SOLIDS HANDLING

Creating biosolids and energy, 'Blend, thicken, digest, dewater'

- Organic solids — primary and secondary scum and sludge from the sedimentation and clarifier tanks — are blended and thickened in dissolved air flotation tanks. The solids are then pumped to digester tanks where anaerobic bacteria at 98 degrees Fahrenheit break down organic material and kill pathogens. The activity of the bacteria creates digester gas and reduces the solids mass by 50 percent.
- The digested solids are then pumped from digesters to equipment that uses centrifugal force to remove excess water from the solids.
- The resulting dewatered solid material is nutrient-rich biosolids, safe for use as a soil amendment.
- South Treatment Plant has been nationally recognized for its environmental management system and commitment to continual improvement.

King County
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